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Olivine-FeS Partial-Melt

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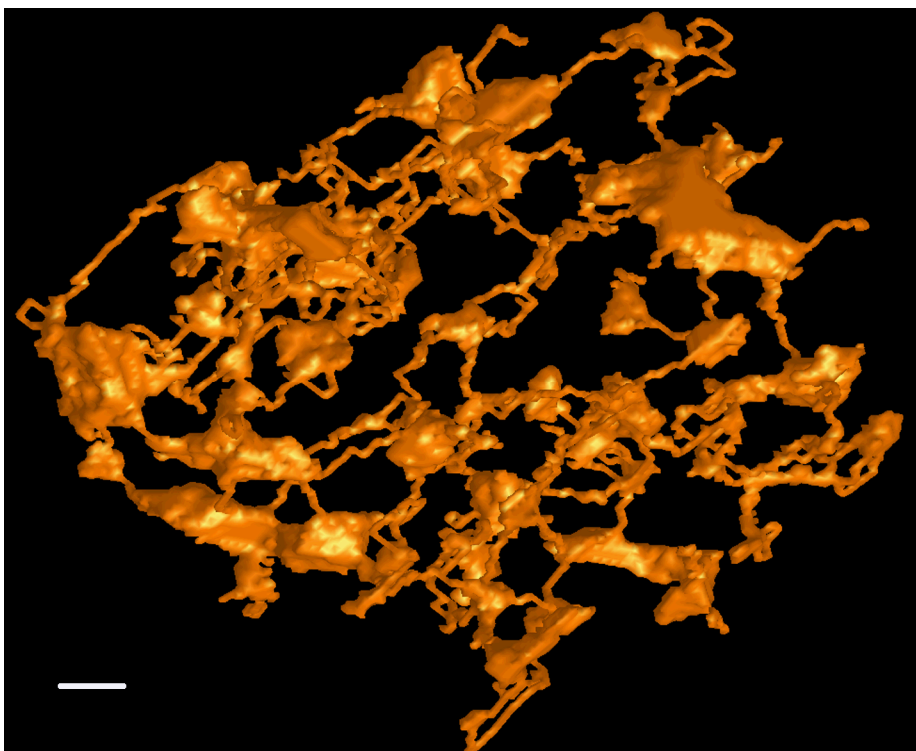
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The figure shows Fe-S-filled melt channels in olivine created at high temperature and pressure. The 3D image was obtained on Beamline 8.3.2 at the Advanced Light Source, Lawrence Berkeley Laboratory, with a spatial resolution of better than two microns (bar is 10 microns).

Permeability of Fe-S melts in olivine at high temperatures and pressures provides an important constraint on models of planetary core formation. Permeability must be inferred from empirical relationships based on microstructure. To date, estimates of permeability have varied by more than five orders of magnitude. To provide more accurate constraints, we used high-resolution synchrotron radiation computed tomography to image the three-dimensional network of melt-containing pores in an olivine matrix, and calculated the permeability directly by solving the equations of Stokes flow through the actual pore network using a lattice-Boltzmann approach. These calculations provide an independent constraint on models of planetary core formation.

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Thank you for your consideration.

Regards,

John Kinney

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